TITLE OF THE INVENTION

PROCESS FOR FORMING GROUPS OF ARTICLES OF THE TOBACCO PROCESSING INDUSTRY

INVENTORS

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P24720.S02

PROCESS FOR FORMING GROUPS OF ARTICLES OF THE TOBACCO PROCESSING INDUSTRY

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority under 35 U.S.C. §119 of European Patent Application No. 03 003 658.6, filed on February 18, 2003, the disclosure of which is expressly incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The invention relates to a process for forming article groups from a respectively predetermined number of articles of the tobacco processing industry in a packing device. The articles are transported from a production device by a conveying device to the packing device.

2. Discussion of Background Information

[0003] Various processes and devices are known from German Patent Application No. DE-OS 1 632 205, which corresponds to U.S. Patent No. 3,603,445, by which blocks of cigarettes can be assembled from a continuous series of cigarettes and can be transferred in corresponding pockets of a pocket conveyor. To form blocks of cigarettes, continuous series of cigarettes are removed without interruption.

[0004] Furthermore, a process and a device for forming and transferring cigarette groups in a packaging machine with several packaging lines is known from European Patent No. EP-B-0 764 582.

[0005] As further prior art, from European Patent Application No. EP-A-0 602-683 a production process for tobacco articles is known with a production line that comprises a production machine for the articles and a block forming machine for forming article groups with a predetermined number of articles. The articles are conveyed from the production machine to the group forming machine by a conveyor device, whereby a transfer device is provided, which assembles an

unbroken and continuous series of articles, whereby in the packing device a group with a predetermined number of articles is arranged, e.g., in a pocket.

SUMMARY OF THE INVENTION

[0006] Accordingly, the present invention provides the quality assurance in the formation of article groups with articles of the tobacco processing industry. In this way, it should be possible to influence the formation of the article groups.

[0007] The invention provides a process for forming article groups from respectively a predetermined number of articles of the tobacco processing industry, in particular cigarettes, in a packing device. The articles are transported from a production device by a conveyor device to the packing device, and at least one feature is detected for each article.

[0008] The invention is based on the idea that an article-specific feature is determined for each article so that during the formation of blocks of the articles, in particular cigarettes, the composition of the article group is known with regard to the article-specific feature. For example, the condensate and/or nicotine content of a cigarette is detected as an article-specific feature. The quality management is improved on the basis of these feature values, since the production of cigarettes and of completed cigarette packs is monitored in the long term, thus, making it possible to make assertions about the production process or the production machines as well as data on the article groups formed. Since, e.g., the condensate content or nicotine content of cigarettes can vary, according to the invention it is possible to ascertain whether the total condensate content or total nicotine content of an article pack or article group (on average) remains constant or varies over a production period.

[0009] Preferably the at least one feature is detected during production and/or during the conveyance of the article.

[0010] In particular the geometric measurements and/or chemical and/or physical properties are detected as features of the articles. These measurable features of the articles are article-specific or characteristic and can differ from

article to article. Geometric measurements are understood to be in particular the length and the width and the volume of the article. Chemical properties can be, e.g., the condensate content or the nicotine content of a cigarette, since the content of these substances is decisive for the taste and the effects on health of a smoker. A physical property of an article of the tobacco processing industry can be, e.g., the degree of ventilation of a cigarette.

[0011] Both general and specific assertions about the manufactured articles to be packaged, in particular cigarettes, can be made by these article-specific parameters.

[0012] Within the scope of the invention, the detection of a feature also relates to the corresponding assignment of the article parameters to the respective location of the article after the detection of the feature. It is thus rendered possible to say with precision which cigarettes are assigned to a cigarette group in a pocket so that it is easy to trace in which pack or cigarette group a defective cigarette is located.

[0013] According to an advantageous embodiment of the invention it is proposed that at least one characteristic value for each article group is formed from the features of the articles. The characteristic value formed is specific and characteristic for the respective article group formed, so that for each article group formed, e.g., the total nicotine content of all the articles can be determined.

[0014] In particular the mean value of the features of the articles in an article group is determined as the characteristic value.

[0015] If it is ascertained, for example, that an article does not meet a feature-norm, i.e., that , e.g., the nicotine content exceeds the value set down by law or that a cigarette is too short, it is provided according to the invention that depending on its at least one feature an article is removed before the formation of an article group. It is thereby ensured that the composition of an article group is influenced in a targeted manner so that both the article group and each article meets certain quality or selection criteria. If, for example, the total nicotine content of an article group is not to be exceeded, within the scope of the invention

it is possible for the last articles that are to be inserted, which exhibit an increased nicotine content and would lead to the total nicotine content of all the articles or cigarettes of the articles being exceeded, to be removed and other subsequent or available articles with a lower nicotine content to be assigned to the article group to be formed.

[0016] In an advantageous further development an article group is removed depending on the totality of the features of the articles and/or depending on the characteristic value. The process according to the invention permits that, after the group formation, an article group can be removed from the further production process, if this article group does not meet certain selection or quality criteria. Thus only those cigarette packs reach the market which exactly meet the qualitative and/or legal norms. Furthermore, it is advantageous if the features of the articles and/or the characteristic values of the article groups are stored. A supply of data or a database is thus created for the produced and packaged articles, which makes it possible to monitor the quality of the produced articles or groups over a longer period.

[0017] To this end it is provided that the features of the articles and/or the characteristic values of the article groups are managed by a computer processing unit, particularly a central computer processing unit.

[0018] The present invention is directed to a process for forming article groups in a packing device from a predetermined number of articles of the tobacco industry. The process includes transporting the articles from a production device to the packing device, and detecting at least one feature for each article.

[0019] In accordance with a feature of the invention, the articles can be transported on a conveyor device.

[0020] According to another feature of the invention, the at least one feature may be detected during at least one of production of the article and the transporting.

[0021] According to still another feature of the present invention, the at least one feature can include at least one of geometric measurements, chemical properties, and physical properties of the article.

[0022] In accordance with the invention, the process can further include forming a characteristic value for each article group from the at least one feature of the articles. Further, the characteristic value can be formed by a mean value of the at least one features of the articles in the article group. The process can also include removing an article group for reasons related to at least one of a totality of the at least one features of the articles and the characteristic value. At least one of a value related to the at least one feature of the articles and to the characteristic value of the article groups is stored. Still further, the at least one of the value related to the at least one feature of the articles and the characteristic value of the article groups can be managed by a computer processing unit, and the computer processing unit can include a central computer processing unit.

[0023] The process may further include, before formation of the article group, removing an article for reasons related to the at least one feature.

[0024] According to another feature of the instant invention, the process can also include removing an article group for reasons related to a totality of the at least one features of the articles.

[0025] Moreover, a value related to the at least one feature of the articles can be stored.

[0026] The value related to the at least one feature of the articles can be managed by a computer processing unit, and the computer processing unit may include a central computer processing unit.

[0027] The present invention is directed to a process for forming article groups in a packing device from a predetermined number of articles of the tobacco industry. The process includes transporting the articles from a production device to the packing device, counting a predetermined number of articles representative

of an article group, forming an article group with the counted articles, and detecting at least one feature for each article.

[0028] According to a feature of the invention, when the at least one feature of a specified article is not within a desired range, the process can further include rejecting the specified article. The rejected article is not counted as part of the article group.

[0029] Further, when a totality of the at least one features of a specified article group is not within a desired range, the process may further include rejecting the specified article group.

[0030] In accordance with the invention, the at least one feature is detected during at least one of production of the article and the transporting.

[0031] In accordance with still yet another feature of the present invention, the at least one feature comprises at least one of geometric measurements, chemical properties, and physical properties of the article.

[0032] Other exemplary embodiments and advantages of the present invention may be ascertained by reviewing the present disclosure and the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033] The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings by way of non-limiting examples of exemplary embodiments of the present invention, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

[0034] Figure 1 illustrates a diagrammatic arrangement for carrying out the process according to the invention; and

[0035] Figure 2 illustrates another arrangement for carrying out the process according to the instant invention.

[0036] In the drawings the same reference numbers are assigned to the same or same kind of elements and parts so that a new introduction each time is omitted.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0037] The particulars shown herein are by way of example and for purposes of illustrative discussion of the embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the present invention. In this regard, no attempt is made to show structural details of the present invention in more detail than is necessary for the fundamental understanding of the present invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the present invention may be embodied in practice.

[0038] Figure 1 shows in a diagrammatic representation an arrangement by which the process according to the invention can be carried out. In a production machine 10, e.g., a cigarette production machine, cigarettes 15 are produced which are delivered from production machine 10 to a conveyor device 12. Cigarettes 15 are transported from production machine 10 to a packing machine 20 and from there placed in a pocket or other container so that cigarette packs 25 with a predetermined number of cigarettes leave the cigarette packing machine. In subsequent steps (not shown), several cigarette packs are combined to form a bundle.

[0039] During the production of cigarettes 15 in production machine 10, one feature is continuously determined for each cigarette. For example, the length or width of the cigarette can be determined as a feature. Moreover, by test devices physical properties, such as, e.g., the degree of ventilation of the cigarette or chemical properties of the cigarette can also be detected. In an alternative embodiment several features can be determined for one cigarette.

[0040] The determined features are forwarded to a computer processing unit 40, such that computer processing unit 40 can be synchronized with conveyor device 12, so that, for each cigarette 15 on conveyor device 12, the location of the cigarette and the respective feature or the respective features can be clearly

assigned to one another or clearly correlated. If several features are ascertained for a cigarette, a so-called feature vector can be assigned to the corresponding cigarette on conveyor device 12 by computer processing unit 40.

[0041] Based on the features x_{i-1}, x_i, x_{i+1} for the (i-1)-th, i-th, (i+1)–th cigarette (i = 2, 3, 4, ...) provided by production machine 10, the composition of packs 25 each with a predetermined number of cigarettes from the continuously fed stream of cigarettes is determined. A customary cigarette pack has a number of 20 cigarettes. A precise knowledge of the cigarettes in a pack is obtained because of the ascertained features of the individual cigarettes. Subsequently, statistical evaluations can be made, so that quality assertions can be made about the production process or the quality of the cigarettes.

[0042] Figure 2 shows in diagrammatic form another embodiment of the process according to the invention. During the transport of cigarettes 15 on conveyor device 12 it is tested by computer processing unit 40 on the basis of the features determined by production machine 10 whether a cigarette is defective. In the exemplary embodiment shown here a cigarette determined to be defective and marked is labeled with reference number 16.

[0043] Before fed cigarettes 15 are assembled into a cigarette pack by the packing machine, the cigarettes pass through an ejection device 30 and a compression machine 35. Defective cigarette 16 is removed from the fed stream of cigarettes 15 by ejection device 30. To fill the gap made in the stream of cigarettes, the gap is closed by compression device 35. This can be carried out, e.g., in that the cigarettes downstream of the gap made are displaced or a cigarette from a supply of compression machine 35 is inserted.

[0044] By the exemplary embodiment shown, the cigarettes that do not meet predetermined, e.g., statutory norm ranges or quality criteria are detected and removed. In a further variant, it is possible that in cigarette packing machine 20 groups of cigarettes are assembled which meet the set criteria in the total sum of a feature or in the mean value of a feature. For example, it can be determined by

computer processing unit 40 whether a consecutive row of cigarettes that are assembled to form a pack on average exceed a fixed value regarding nicotine content. If the actual value of the cigarettes is higher than this desired value, individual cigarettes are determined from the row and are ejected and replaced by other suitable cigarettes, so that the selected norm is met together with the subsequent cigarettes.

[0045] Through the process according to the invention, it is possible to clearly improve quality assurance in the production and packing process of cigarettes or articles of the tobacco processing industry, so that the assembled articles in a pack or in a bundle meet predetermined criteria.

[0046] It is noted that the foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention. While the present invention has been described with reference to an exemplary embodiment, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Changes may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects. Although the present invention has been described herein with reference to particular means, materials and embodiments, the present invention is not intended to be limited to the particulars disclosed herein; rather, the present invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.

List of Reference Numbers

10	Production machine
12	Conveyor device
15	Cigarette
16	Defective cigarette
20	Packing machine
25	Cigarette pack
30	Ejection device
35	Compression device
40	Computer processing unit
x_i	Feature of the i-th cigarette